SESSION 1

Introduction, Scope And What is Road Safety Audit, Stages

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REMARKS ON ROAD SAFETY

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FIGURE 1 FATALITIES AND SAFETY INTERVENTIONS

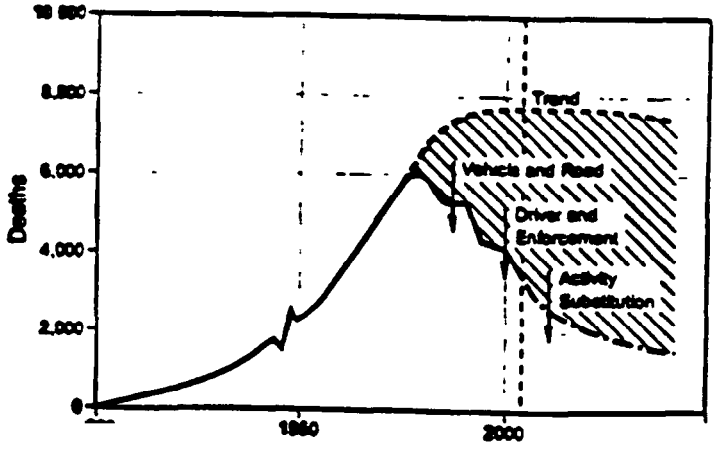
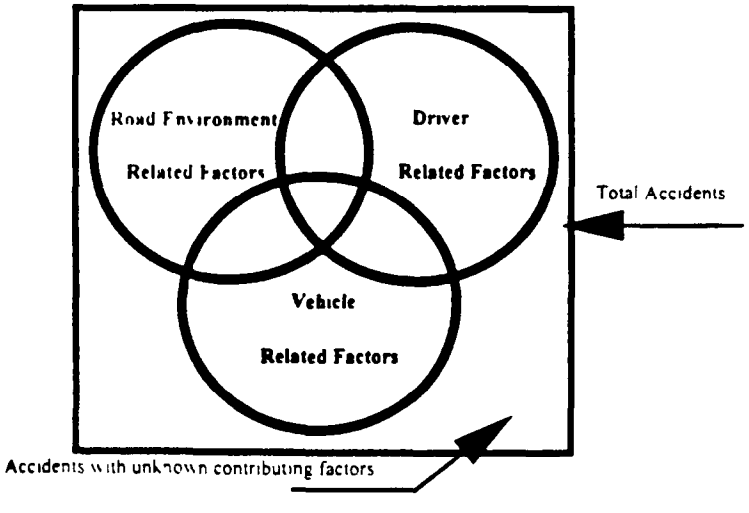


TABLE 1 ROAD SAFETY INITIATIVES OVER TIME

Year	Vehicle (car)	Driver	Road	Operations/Administration	Other
1900	4 Wheel Brakes		Centre line Cats eyes & reflectors	Red-Green Semaphore Stop Sign Red-Green Signal School Patrol Mirror Box (speed)	ACA - AAA
1920	Balloon Tires Laminated Glass		Auto Birth Speed on Curves	Shuts Windshields Traffic Theory	NRC Uniform Vehicle Code ITE MUTCD
1940	Self Adjust Brakes Seat Belt Padded Dash Head Restraint 3 - Point Belt		Roadsys MJ Barrier Clear Zone Barrier Warrants	Webster's Manual Radar Highway Capacity Manual	AASHTO Blue Book Accident Form
1960 (1970)	Dual Master Cylinder Radial Tires Collapse Steering Side Door Beam Air Bag Anti Lock Brakes Continuous Seat Belt	DWI Hybrid II dummy Hybrid III dummy Special Simulators	Hydroplaning Truck Runway Lanes Brake Away Signs Reflective Lines Energy Impactors	1965 RCM Fog Buttons (?) Speed Photo-radar Conflict Analysis Red Light Camera Freeway Surveillance	Wisconsin Seat Belt IIHSB (Haddon) 20 Auto Statistics Victoria Seat Belt Law AAAM IHS
1980	Belt Tensioners High Tail Light Day Time Lights Side Air Bags Proximity Warning Rear Infrared Lights EID Simulators		Truck Wall Reliability Designs Smart Warning SR 214 TRB	Passing Distance Laser Local Weather Station KB Road Maintenance	CARSP New York Seat Belt Law MADD/SADD New Car Assessment Program
2000 2010	Smart Warning Smaller Cars	Driver Simulators Linked to new roads All the Bells DWI	Smart Hazard Alert Address Alert Virtual Road Rehabilitation	AI Based Operations and Enforcement Computer Simulated Environments	Special Interest Groups Safety Planning

WHAT CAN THE ROAD ENGINEER DO TO IMPROVE ROAD SAFETY?



DEFINITIONS

- **ROAD SAFETY AUDIT** is a FORMAL and INDEPENDENT review of a proposed road design by an EXPERT safety team to assess the MULIT-MODAL SAFETY PREFORMANCE of a design.

- **ROAD SAFETY REVIEW** is an INDEPENDENT review conducted during the design process of a proposed road design by an EXPERT safety team to assess the MULIT-MODAL SAFETY PREFORMANCE of the design.

RISK

RISK=EXPOSURE*P(CRASH) *CONSEQUENCES

- **EXPOSURE**, this is the number of persons exposed to the particular hazard.
- **CONSEQUENCES**, this is the FORGIVING HIGHWAY that assumes a crash will occur and attempts to minimize the injury.
- **P(CRASH)**, this is the chance that a crash will occur. The CARING HIGHWAY attempts to reduce this chance.

FIGURE 3 THE HIGHWAY DESIGN PROCESS AND SAFETY AUDITS/REVIEWS

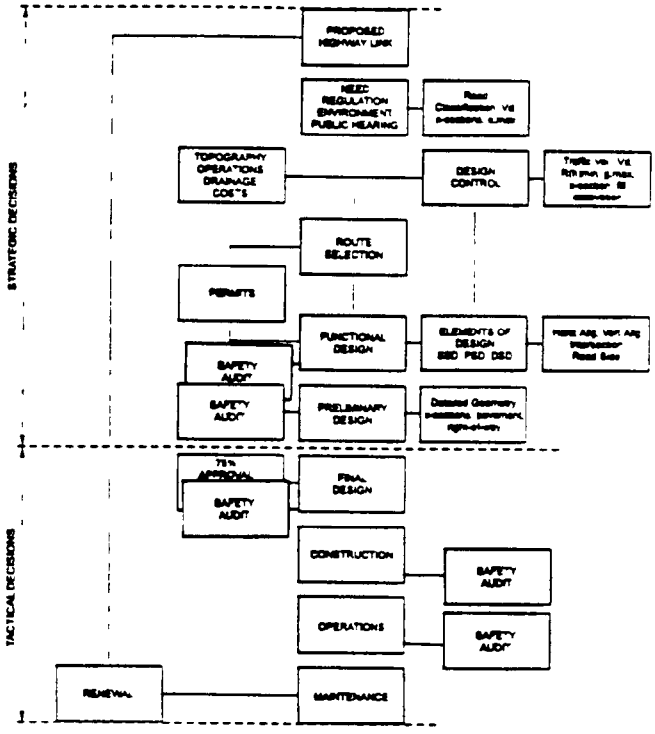
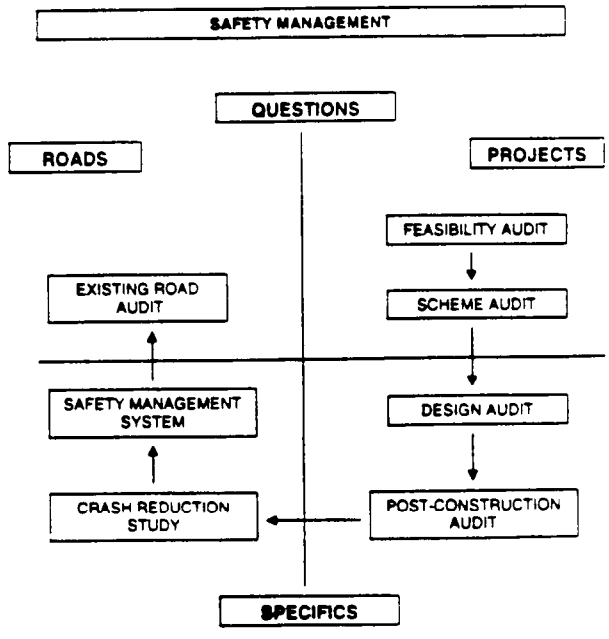


FIGURE 2 THE "MELBORNE MAP" FOR ROAD SAFETY AUDITS



REMARKS on ROAD SAFETY AUDITS

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Road safety is measured by public opinion. Public perception establishes whether a road is considered safe or not safe. Once a road is labeled a "killer highway" or that it has a "suicide curve" then engineers and public administrators must work long and hard to correct such impressions. This effort is needed even though, the road is built to the standards of the day and may, in fact have no more than the expected number of collisions

This seminar will demonstrate how to do road safety audits that will help you avoid building such roads. If such situations do exist then the process will help you locate them and establish the actual safety performance of the site

The downward trend of road fatalities started in about 1970 as shown in Figure 1. Selected important safety events are given in Table 1. Prior to that time the prevailing engineering attitude towards road accidents blamed the driver since engineering thought that it had provided the best possible vehicle and road In about 1970 the design of the Forgiving Highway to reduced the consequences of a crash became more formalized with the introduction of roadside barriers, energy absorbing devices and clear zones. Since about 1990 we are entering the era of the Caring Highway in which the road tries to protect the driver from harm by avoiding collisions. Road safety audits are part of the Caring Highway process

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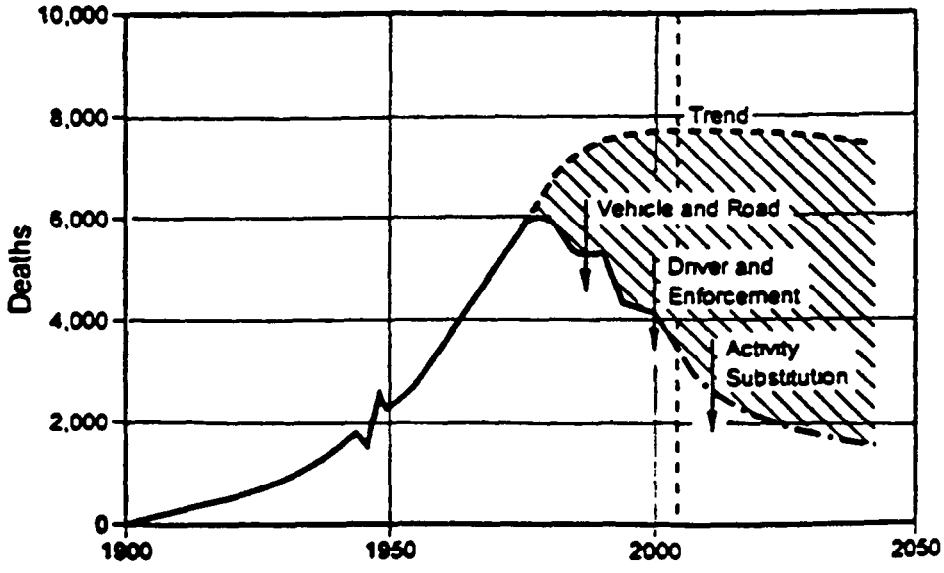
FIGURE 1 FATALITIES AND SAFETY INTERVENTIONS



ROAD SAFETY AUDIT/REVIEW

Road safety audit is defined as a **formal** and **independent** review of a proposed road design by an expert safety team to assess the **multi-modal safety performance** of a design.

Road safety review is an **independent** review conducted during the design process of a proposed road design by an expert safety team to assess the **multi-modal safety performance** of the design.

The definitions indicate that this area of knowledge in for the **EXPERT**. The present state-of-the-art requires considerable experience with many different aspects of road safety. Under ideal conditions the auditor has knowledge in road design, accident reconstruction, traffic operations and enforcement As we learn more about road safety and specifically road safety audits/reviews the requirement for an expert should diminish, as the knowledge becomes more generally available to the profession.

Before studying the details of road safety audit/review you should be aware of some of their general characteristics. A diagram known as the Melbourne Map was developed by Evan Chadfield of New Zealand at the 1998 International Road Safety Audit Forum The diagram, Figure 2 sorts out the difference between audit/review and crash investigation or black spots. Crash investigations review known problems, are data driven and are reactive in nature Audits/reviews look for unknown problems to improve a system that is yet to be built (ideally) based on expert knowledge and is proactive in nature.

The early audits/reviews are at the Functional and Preliminary Design stages These are early proactive interventions that raise only safety questions and may also make recommendations for changes. These are the best places to have audits/reviews The last of the proactive interventions is the Final Design where changes may still be made but they are difficult.

The safety audit/review at end of construction or pre-opening is essential This intervention catches the "safety blunders" that result during the construction process These are much easier to conduct since the physical facility exists and it is possible to see the interaction of safety elements. The in-service audit /review is the one most frequently undertaken but is not necessarily the most cost effective since many safety recommendations are expensive to implement.

In-service or existing road audits review existing facilities. This type of audit should be part of a corridor improvement but an audit at this late stage is reactive and not proactive as in the earlier stages. The general impression from around the world is that there are too many in-service audits.

FIGURE 2. THE "MELBORNE MAP" FOR ROAD SAFETY AUDITS